

Portneuf River TMDL Implementation Plan

assembled by:

Pocatello Regional Office
Idaho Department of Environmental Quality
444 Hospital Way, # 300
Pocatello, ID 83201

July 2003

**PORTNEUF RIVER TOTAL MAXIMUM DAILY LOAD
IMPLEMENTATION PLAN
TO ADDRESS DISCHARGE OF
GROUNDWATER CONTAINING ORTHOPHOSPHATE
FROM THE
SIMPLOT PLANT AREA PORTION
OF THE
EASTERN MICHAUD FLATS SUPERFUND SITE**

June 2002

Prepared for:

J. R. SIMPLOT COMPANY

P.O. Box 912
1130 West Highway 30
Pocatello, Idaho 83204

Prepared by:

MFG, INC.

consulting scientists and engineers

4900 Pearl East Circle, Suite 300W
Boulder, CO 80301
(303) 447-1823
Fax: (303) 447-1836

MFG Project No. 010121-8

TABLE OF CONTENTS

	<u>Page</u>
LIST OF TABLES.....	ii
LIST OF FIGURES	ii
1.0 INTRODUCTION	1
2.0 SUMMARY OF PERTINENT SUPERFUND INVESTIGATION FINDINGS.....	2
2.1 Key Remedial Investigation Findings.....	2
2.1.1 Nature and Extent of Constituents in Groundwater	2
2.1.2 Gypsum Stack Summary.....	3
2.1.3 Constituent Fate and Transport in Groundwater	5
2.2 Findings Since the Remedial Investigation	6
3.0 DESCRIPTION OF THE SUPERFUND REMEDY FOR GROUNDWATER IN THE SIMPLOT PLANT AREA	8
3.1 Feasibility Study Findings	8
3.2 EPA's Record of Decision	8
3.3 Remedial Design/Remedial Action Consent Decree.....	9
4.0 TMDL IMPLEMENTATION PLAN	12
4.1 Extraction System	12
4.2 Remedy Implementation Schedule and Groundwater Monitoring	13
5.0 REFERENCES	14

LIST OF TABLES

<u>Table</u>	<u>Title</u>
1	Summary of Proposed Extraction Wells and Design Pumping Rates
2	Estimated Orthophosphate Removal Rate in Extraction Wells
3	Anticipated Groundwater Extraction Implementation Schedule

LIST OF FIGURES

<u>Figure</u>	<u>Title</u>
1	Site Location Map
2	Eastern Michaud Flats Groundwater Monitoring Well Network
3	Arsenic Concentrations in Shallow Aquifer (Site Wide from the RI)
4	Sulfate Concentrations in Shallow Aquifer (Site Wide from the RI)
5	Selenium Concentrations in Shallow Aquifer (Site Wide from the RI)
6	Orthophosphate Concentrations in Shallow Aquifer (Site Wide from the RI)
7	Upper Zone Potentiometric Surface and Groundwater Flow Direction Maps (1995/2001)
8	Orthophosphate Concentrations in Simplot Plant Area Shallow Groundwater – 1995 and 2001
9	Orthophosphate Concentrations in Shallow Groundwater Downgradient of the Western Portion of the Gypsum Stack
10	Orthophosphate Concentrations in Shallow Groundwater Downgradient of the Eastern Portion of the Gypsum Stack
11	Orthophosphate Concentrations in Batiste Spring
12	Proposed Groundwater Extraction Well Locations

1.0 INTRODUCTION

This document has been prepared at the request of Idaho Department of Environmental Quality (IDEQ) to support their development of a Total Maximum Daily Load (TMDL) Implementation Plan to address sediment, bacteria and nutrient (phosphate and nitrate) loads in the Portneuf River. Specifically, this document describes current orthophosphate discharges to the river in groundwater affected by Simplot operations and how these discharges will be mitigated through implementation of the Superfund remedy.

The J.R. Simplot Company operates a fertilizer production facility in the vicinity of the Portneuf River, downstream of Pocatello, Idaho. The facility (the Don Plant) and the adjacent FMC Elemental Phosphorus Facility (which ceased operations in December 2001) are included in the Eastern Michaud Flats Superfund Site which was listed on the National Priorities List (NPL) on August 30, 1990. For the purposes of investigation and remedy development/selection, the EPA has divided the site into three areas, as shown on Figure 1. The FMC Plant Area includes the FMC facility and adjacent land owned by FMC. The Simplot Plant Area includes the Don Plant and adjacent land owned by Simplot. The Off-plant area surrounds the FMC- and Simplot-Plant Areas.

As part of the Superfund process an exhaustive investigation of environmental conditions was performed at the Site as reported in the Remedial Investigation Report (Bechtel, 1996a), Baseline Human Health Risk Assessment (Ecology and Environment, 1996a), and Baseline Ecological Risk Assessment (Ecology and Environment, 1996b). The principal findings pertinent to the TMDL was that sources at the Simplot and FMC facilities release constituents (including orthophosphate) to groundwater, that eventually discharges to the Portneuf River via adjacent springs and channel underflow. A range of remedial alternatives to address groundwater at the site were identified and evaluated in Feasibility Study Reports (MFG, 1996; Bechtel 1996b). Based on those studies and remedy evaluation, EPA issued a Record of Decision (EPA, 1998) for the Site in June 1998. A Consent Decree for Remedial Design/Remedial Action has been signed for the Simplot Plant Area portion of the site and was effective on May 9, 2002.

As discussed in this document, groundwater discharge from the EMF site was identified in the Superfund investigation as a source of constituents, including orthophosphate, to the Portneuf River. Implementation of the Superfund groundwater remedy in the Simplot Plant Area (groundwater containment by extraction and reuse in the Don Plant process) is expected to address releases of orthophosphate from Simplot sources at the site.

2.0 SUMMARY OF PERTINENT SUPERFUND INVESTIGATION FINDINGS

This section provides a summary of pertinent data collected at the EMF site. As described, a considerable amount of data has been generated for groundwater at the site and for water quality of springs discharging to the Portneuf River. The first phase of the site investigation was the RI, which was performed in 1992 through 1995 (see Section 2.1). After the RI was completed, Simplot performed investigations to support remedial design of the groundwater extraction system and has continued to monitor groundwater and springs water quality on a semi-annual basis (see Section 2.2).

2.1 Key Remedial Investigation Findings

This section provides a summary of the key findings of the RI that are pertinent to the TMDL. The RI groundwater/surface water investigation at the EMF site was performed from 1992 to 1994 and included:

- Quarterly sampling events from 77 groundwater wells (well locations are shown on Figure 2).
- Collection of surface water/sediment samples from the Portneuf River at approximately 30 locations.
- Samples were typically analyzed for 22 heavy metals, 4 radionuclides and various other constituents (including orthophosphate).

2.1.1 Nature and Extent of Constituents in Groundwater

The nature and extent for constituents in groundwater during the 1992 to 1994 monitoring period are described in the RI report (Bechtel, 1996a). Groundwater monitoring identified numerous source areas at the site and found that the range of constituents associated with the different sources were relatively similar. In the Simplot Plant Area, the RI identified two sources of constituents to groundwater; the gypsum stack, which had a relatively large aerial effect on groundwater quality and the East Overflow Pond (an unlined pond for collection of process water during plant upsets), which had a more localized effect (primarily in the area of paired wells 317 and 318), but resulted in higher constituent concentrations in groundwater. Use of the East Overflow Pond was discontinued in 1993 and subsequent monitoring has found that the pond is no longer a source of constituents to groundwater. Groundwater affected by seepage from the gypsum stack is characterized by increases in concentrations of major ions (notably sulfate),

nutrients (notably phosphate and orthophosphate), and some metals/metalloids (notably arsenic). As an overall summary of site conditions during the RI, isoconcentration maps for arsenic, sulfate, selenium and orthophosphate from the RI report are shown on Figures 3 through 6.

As part of the evaluation of the nature and extent of constituents in groundwater, the RI established background concentrations (i.e., not affected by EMF site sources) for the range of constituents evaluated. For the Portneuf River Valley hydrogeologic area, the background concentrations were 0.0104 mg/L arsenic and 0.27 mg/L orthophosphate (Bechtel, 1996a).

2.1.2 Gypsum Stack Summary

As discussed in Section 2.1.1, after use of the East Overflow Pond was discontinued, the remaining source of constituents in groundwater in the Simplot Plant Area was the gypsum stack. This section provides a brief summary of the operation of the stack and the changes that have occurred in recent years.

In the Simplot Don Plant process, phosphate ore (calcium phosphate), received in slurry form via pipeline from the Smoky Canyon Mine near Afton, Wyoming, is digested with sulfuric acid to produce phosphoric acid. The phosphoric acid is a product and is also used to generate other fertilizer products. The byproduct from the phosphate ore digestion reaction is gypsum (calcium sulfate), which is slurried onto the gypsum stack. As such, the gypsum stack is an integral part of the overall Don Plant process.

The gypsum stack receives approximately 2,400 gallons per minute of slurry with a solids content of approximately 40 percent. The slurry is acidic (pH around 2) and contains a range of constituents, including orthophosphate, at concentrations elevated compared to background groundwater levels. The stack has three separate cells: the lower stack and the eastern and western cells on the upper stack. At the time of the RI, Simplot was using the upper stack only. The lower stack (which had been used historically) was returned to service around 1994 and now gypsum slurry is applied to each of the cells in turn on a schedule of approximately six weeks.

The water balance of the gypsum stack is complex. Water is either collected and returned to the Don Plant process, evaporated, or seeps to groundwater. The gypsum stack has been built on the side of a hill, such that in the northern part of the stack the gypsum is over 300 feet high, but it tapers toward the

south, with the gypsum thickness eventually reducing to zero at the southern-most extent of the stack. Tests performed by Simplot to support the operation of the stack have found that the gypsum permeability decreased as the thickness of gypsum increased and the weight of overlying gypsum increased. Based on these findings, it is believed that the majority of the seepage from the stack to groundwater occurs where the gypsum is thin; i.e. at the southern portion of the upper stacks. During the RI, it was estimated that the seepage from the stack was approximately 500 gallons per minute.

Seepage from the stack is believed to have decreased since the time of the RI for three primary reasons. First, around the time of the RI Simplot instituted a new method of operating the stacks. Originally slurry had been applied to the east and west cells of the upper stack on an annual cycle. Observations in piezometers and wells during this period indicated that while an individual cell was in use seepage was relatively high (water levels increased significantly on the side of the stack that was being used). In the current practice, slurry is applied more evenly over the three cells on the stack (due to a new rim ditching method used to build the stack), over a six-week cycle. After this change was implemented seepage appeared to decrease based on observations of the water levels in the monitoring wells and piezometers.

A second action that is expected to have reduced seepage from the stack to groundwater is that Simplot has recently modified the slurry pumping system to eliminate use of clean water in the pump seals. This clean water used to mix with the slurry and end up on the stack. This modification has reduced the flow rate of water to the stack by approximately 350 gallons per minute. Because less water is being sent to the stack, it is expected that seepage to groundwater has reduced.

Finally, process changes that were implemented in 1991 have gradually been found to have a significant effect of the seepage rate from the stack. Prior to 1991, the phosphate ore was brought to the facility by railcar and calcined prior to processing. In 1991 Simplot completed installation of the slurry pipeline for the ore and discontinued use of the calciners. As the thickness of the gypsum layer from the current process has increased on the stack, the seepage has substantially reduced such that considerably more water stays in the ponds on top of the stack. Accumulation of ponded water on the top of the stack is a significant operational concern for Simplot, because larger quantities of water can make the stack less stable. Therefore, beginning around 1998, Simplot began to pump water directly off the stack back to the Don Plant process. This pump back flow has steadily increased and currently averages about 1,150 gallons per minute.

Therefore, considering the overall water balance, the current stack is expected to have a much lower seepage rate in recent years due to the following effects:

- water flows sent to the stack in the gypsum slurry have not changed significantly since the time of the RI (total average flow of approximately 2,800 gallons per minute with about 31 percent gypsum solids), and the total flow discharged to the top of the stack has been reduced by about 350 gallons per minute due to the replacement of the pump seals on the slurry line;
- water collected by the under drain system and returned to the Don Plant process has remained relatively constant (about 40 gallons per minute);
- evaporation would be expected to have increased slightly, because the wetted area on the stacks is larger; and
- since 1998, water has been pumped directly from the ponds on the top of the stack to the Don Plant process. This flow has steadily increased and is currently approximately 1,150 gallons per minute.

Based on this overall balance, it is expected that an overall reduction would occur in the rate of seepage to groundwater.

2.1.3 Constituent Fate and Transport in Groundwater

As discussed above, the RI identified numerous sources of constituents to groundwater at the EMF site. A key finding was that a sustained hydraulic head (i.e., ponded water) was needed in order to be a source of constituents to groundwater. In areas where a hydraulic head was not present, constituents did not reach groundwater in measurable levels. After use of the East Overflow Pond was discontinued, the remaining source of constituents in groundwater in the Simplot Plant Area was the gypsum stack.

The principal findings of the RI, both with respect to the site and the Simplot Plant Area were as follows:

- Groundwater affected by gypsum stack seepage flows to the north where it mixes with groundwater affected by non-Simplot sources and unaffected groundwater and discharges to the Portneuf River via springs and underflow (ground water flow directions are shown on Figure 7).

- Based on the RI data, it was concluded that there does not appear to be any measurable effect on downstream Portneuf River surface water quality, which is attributable to discharge of groundwater from the FMC and Simplot facilities other than small increases in some common ion concentrations (i.e., orthophosphate).
- The average orthophosphate concentration in water discharging from Batiste Spring during the RI monitoring period was 1.90 mg/L. The background (unaffected by FMC or Simplot) concentrations in groundwater in this area were estimated at 0.27 mg/L orthophosphate.
- Groundwater flow beneath the gypsum stack was estimated at 1 cubic foot per second (cfs); about 5 percent of the downgradient flow in the shallow aquifer (21 cfs) near the regional discharge area associated with the springs and the Portneuf River north of I-86, in the gaining reach. This flow also represents a very small fraction of the estimated average groundwater discharge to the Portneuf River in the gaining reach immediately north (downstream) of the EMF site (approximately 200 cfs).
- Loading analysis in the RI report estimated that FMC and Simplot sources accounted for a 10% increase in total phosphate concentrations in the Portneuf River downstream, compared to upstream (there was no analysis for orthophosphate). Upstream sources accounted for approximately 18% of the downstream load while background groundwater discharge, the sewage treatment plant discharge and other sources accounted for approximately 72% of the downstream load in the river.

2.2 Findings Since the Remedial Investigation

After the RI period, Simplot continued to perform groundwater monitoring and water quality monitoring at Batiste Springs on a semi-annual basis. The principal findings of this monitoring effort are described in this section, along with the findings of an IDEQ investigation in the Portneuf River to support the TMDL.

Orthophosphate concentrations in shallow groundwater in the Simplot Plant Area in 1995 and 2001 are shown on Figure 8. Orthophosphate concentrations in shallow groundwater downgradient of the western portion of the gypsum stack are shown on Figure 9. The data show that concentrations have decreased slightly since the RI monitoring period, but that overall concentrations have been relatively constant over the 10-year monitoring period, typically between 120 and 160 mg/L (wells 307 and 308). Orthophosphate concentrations in groundwater downgradient of the eastern portion of the gypsum stack are shown on Figure 10. These wells are in the vicinity of the lower gypsum stack cell, which was not in use during the RI period, but has been in use since the mid-1990s. The data for well 326 show the effect

of the use of the lower cell, with concentrations increasing after October 1995 and remaining relatively constant between approximately 180 mg/L and 230 mg/L thereafter. The higher concentrations that were measured on the east side likely reflect the influence of seepage from two cells (the upper east cell and the lower cell) as opposed to just one cell on the west side (the upper west cell). Concentrations in wells 316 and 332 steadily increased during the mid-1990s and have been relatively constant since 1999 at approximately 100 to 120 mg/L.

Water quality monitoring has routinely been performed at Batiste Spring, which is in the area affected by EMF sources and discharges via a ditch to the Portneuf River. Orthophosphate concentrations in Batiste Spring are shown on Figure 11. In general, the concentrations were relatively low (less than 5 mg/L) from 1992 to 1994, increased to between 10 to 17 mg/L through 1997 (with one value at 41 mg/L, which could be an anomaly) and have been decreasing since (the last three values are 6 mg/L or below). A seasonal effect is also shown in the data, with concentrations lower in the summer.

Overall the data support the RI findings that the gypsum stack is the source of orthophosphate to groundwater in the Simplot Plant Area and that remediation of the East Overflow Pond was successful. Concentrations of orthophosphate in groundwater downgradient of the gypsum stack have been relatively constant with the exception of localized increases immediately downgradient of the lower gypsum stack cell, which was not in use in the early 1990s. The data also show that orthophosphate concentrations in Batiste Spring increased during the mid-1990s and have reduced since about 1998.

In addition to these studies IDEQ performed a detailed study of orthophosphate concentrations in the Portneuf River in the vicinity of the EMF site in 2000 and 2001. Their investigation (report not yet published) is reported to have estimated that orthophosphate loads in the river attributed to EMF groundwater discharge were 1,451 lbs/day in September 2000 and 1,234 lbs/day in August 2001.

3.0 DESCRIPTION OF THE SUPERFUND REMEDY FOR GROUNDWATER IN THE SIMPLOT PLANT AREA

This section provides a summary of the groundwater remedy selected by EPA for the Simplot Plant Area of the EMF Superfund site.

3.1 Feasibility Study Findings

The Feasibility Study (FS) for the Simplot Plant Area was approved by EPA in 1996. The FS built on the RI findings that the gypsum stack was the remaining unremediated source of arsenic and other constituents (including orthophosphate) to groundwater in the Simplot Plant Area and identified and evaluated a range of remedies to address the stack. These remedies included source controls, such as installing a geomembrane liner on the stack or converting the process to dry stacking, and containment options such as groundwater extraction with treatment and discharge to the Portneuf River or with reuse in the Don Plant. Based on the FS evaluation criteria, groundwater extraction with reuse in the Don Plant was identified as being most protective of human health and the environment, as meeting applicable or relevant and appropriate requirements, and being most effective in the short- and long-term. It was also more cost effective than source controls, which were estimated to cost in the hundreds of millions of dollars.

3.2 EPA's Record of Decision

Based on the findings of the RI/FS, EPA issued its Record of Decision for the EMF Site on June 8, 1998. The State of Idaho concurred with the selected remedy, as described in Appendix C to the Record of Decision.

For the Simplot Plant Area, EPA's selected remedy contained the following components pertinent to groundwater remediation: (1) groundwater extraction on the northern edge of the gypsum stack and reuse of the extracted water in the Don Plant process; (2) improvement to the gypsum stack decant system, developed based on operational considerations at the time of implementation; and (3) groundwater monitoring to evaluate the performance and protectiveness of the extraction system and stack water management improvements.

As described in the Record of Decision, the purpose of the extraction system is: (1) to contain the migration of constituents of concern (COCs) from the gypsum stack and reduce the aerial extent of shallow groundwater contamination within the Simplot Plant Area in excess of drinking water Maximum Contaminant Levels (MCLs) or Risk-Based Concentrations (RBCs) from EPA's risk assessment; and (2) prevent the migration of COCs above MCLs or RBCs into the Off-Plant Area. Where there is an MCL, the MCL shall control.

3.3 Remedial Design/Remedial Action Consent Decree

A remedial design/remedial action Consent Decree was developed by EPA and the Department of Justice and signed by Simplot in 1998. The Consent Decree was subsequently modified by the Department of Justice based on comments by the Shoshone Bannock Tribes on the remedy for the Off-Plant Area. A second Consent Decree was negotiated that addressed DOJ's concerns and was signed by Simplot in 1999. After this time additional comments from the Tribes were received by DOJ; the Consent Decree was renegotiated a third time to address their concerns and signed again by Simplot in early 2001. Finally, DOJ received comments from the State regarding their concerns with orthophosphate and the TMDL. These concerns were addressed by a minor modification to the reservation of rights language and Simplot signed the Consent Decree for the fourth time in August 2001. This Consent Decree was entered by the court on May 9, 2002.

The following text sets out the objectives and performance standards for groundwater remediation and is taken directly from the Consent Decree Statement of Work.

The Groundwater Extraction system shall consist of a network of shallow and deep extraction wells located near the northern edge of the gypsum stack and also includes any engineering controls to reduce the volume of water on the surface of the gypsum stack. The extracted groundwater will be conveyed to the Don Plant and recycled into the Don Plant process water system.

EPA recognizes that operation of the extraction system may not necessarily result in achievement of the MCLs or RBCs throughout the plant area and has not identified this as performance criteria until closure of the gypsum stack. After closure of the gypsum stack, operation and maintenance of this system will continue until COCs in groundwater throughout the Simplot Plant Area are reduced to below MCLs or RBCs, or until EPA determines that continued groundwater extraction would not be expected to result in additional cost effective reduction in contaminant concentrations within the Simplot Plant Area. Institutional controls will remain in place to control groundwater use until MCLs or RBCs are achieved in the Simplot Plant Area.

- a. *The objective of the extraction well system is to prevent the migration of arsenic and other COCs at concentrations above MCLS or RBCs into the Off-Plant Area. Where there is an MCL, the MCL shall control. The extraction system, in combination with the Institutional Controls Program and the Groundwater Monitoring Program, will address this remedial action objective and the overarching objective of protecting human health and the environment. The extraction system shall operate at least as long as the gypsum stack is receiving gypsum.*
- b. *Performance standards for the groundwater extraction system are as follows:*
 - *Demonstrate hydraulic control for groundwater influenced by gypsum stack seepage. Preliminary work indicates the cumulative annual average pumping rate necessary to achieve hydraulic control during operation of the gypsum stack is 750 gpm. The annual average pumping rate will be established through system design, including the schedule for implementation and achievement of the required pumping rate. At a minimum, the implementation schedule will allow for a system startup period of one year.*
 - *Once the annual average pumping rate has been achieved, the performance standard will be the MCLs or RBCs for arsenic and other contaminants of concern, as measured at Batiste Spring and other Off-Plant Area locations. Where there is an MCL, the MCL shall control.*

Groundwater Monitoring Element of Work

The Groundwater Monitoring Element of Work includes sampling and analysis of groundwater from selected wells, and the evaluation and reporting of monitoring data.

- a. *The objective of groundwater monitoring is to collect sufficient data of adequate quality to evaluate the performance of the extraction system and other source control measures in reducing the extent and concentration of arsenic and other contaminants of concern in groundwater in the Plant Area and in preventing migration of arsenic and other COCs into the Off-Plant Area at concentrations above MCLs or RBCs. Where there is an MCL, the MCL shall control. Specifically, components of the monitoring program will provide data to document the effectiveness of the extraction system in capturing seepage from the gypsum stack, to track water quality in areas potentially affected by sources other than gypsum stack seepage, and to confirm the attainment of performance standards and the long-term effectiveness of the remedy.*
- b. *Performance standards for Groundwater Monitoring are as follows:*
 - *Groundwater samples will be collected from wells on a quarterly basis for a period of five years and the samples analyzed for arsenic and other site related constituents. The specific wells to be monitored, the analytes, and the data evaluation procedures will be provided in the draft Groundwater Monitoring RDR.*
 - *After the five-year period, the monitoring locations and frequency will be evaluated and monitoring will continue on at least a semiannual basis.*

- *Monitoring of Batiste Spring and other locations in the Off-Plant Area will be initiated on a quarterly basis at the time of system startup. After successful demonstration of compliance with the performance standard, as described in Section III.D.4.b, samples will be collected semi-annually. The data evaluation procedures are provided in the draft Groundwater Monitoring RDR.*

As described above, the Superfund remedy includes containment of groundwater affected by the gypsum stack and monitoring of groundwater and springs that discharge to the Portneuf River that will allow for long-term demonstration that the extraction system is effective in addressing Simplot sources of orthophosphate. The performance standard set out in EPA's Record of Decision and the subsequent RD/RA Consent Decree is to meet MCLs at the springs that discharge to the Portneuf River. Arsenic is the primary focus of the Superfund remedy, however, the MCL is 0.01 mg/L; below naturally-occurring background levels established in the RI of 0.0104 mg/L. Because the Superfund remedy requires reduction of arsenic to background levels, it is expected to also be effective for orthophosphate released from the gypsum stack.

4.0 TMDL IMPLEMENTATION PLAN

This section provides a description of the Superfund remedial design and implementation. Implementation of the Superfund remedy will address releases of orthophosphate to the river from groundwater affected by Simplot sources (i.e. the gypsum stack). It will not address non-Simplot sources at the site.

4.1 Extraction System

The draft design of the groundwater extraction system contains a total of 11 extraction wells pumping an annual average rate of approximately 750 gallons per minute. The proposed location of the extraction wells are shown on Figure 12. The proposed extraction well pumping rates are shown on Table 1.

Using the estimated extraction rates and the orthophosphate concentrations measured in groundwater in the vicinity of the proposed wells, an estimate of the orthophosphate removal rate from groundwater by the extraction system can be made. As shown in Table 2, this estimate is in the range of 1,200 to 1,500 pounds per day orthophosphate removal. This range is similar to the estimate made by IDEQ that orthophosphate loads in the river attributed to EMF groundwater discharge were 1,451 lbs/day in September 2000 and 1,234 lbs/day in August 2001.

The groundwater extraction system is also expected to have a relatively rapid effect on reducing orthophosphate concentrations discharging to the river for two primary reasons. First, groundwater travel time from the stack to the river was estimated in the RI to be of the order of a few months and therefore groundwater downgradient of the extraction system with elevated constituent concentrations is expected to flush out of the system relatively quickly. Secondly, site-specific data indicate that orthophosphate partitioning to aquifer solids is not significant and therefore concentrations downgradient of the extraction system are expected to reduce relatively quickly. Measurements of orthophosphate concentrations on aquifer solids immediately downgradient of the gypsum stack indicate typical partition ratios in the order of 1 to 3 L/kg (indicating that orthophosphate concentrations on the aquifer solids are 1 to 3 times the corresponding groundwater orthophosphate concentration). Orthophosphate sorbed to aquifer solids is therefore not expected to be a significant long-term source to groundwater downgradient of the extraction system.

4.2 Remedy Implementation Schedule and Groundwater Monitoring

This section provides a summary of the design and proposed implementation schedule for the extraction system. A summary of the overall anticipated schedule is shown on Table 3.

As discussed previously, the remedial design/remedial action Consent Decree was entered by the court on May 9, 2002. The Consent Decree specifies that the groundwater extraction design will be prepared in three sequential documents; a draft Remedial Design Report (RDR), a Prefinal RDR, and a Final RDR. EPA and IDEQ will review the documents and provide written comments that will be addressed by Simplot in the subsequent document. EPA will provide approval of the final RDR, at which time implementation will occur. Based on the document preparation schedules set out in the Consent Decree Statement of Work and allowing a month for each Agency document review, it is anticipated that the final RDR will be approved by EPA in March 2003.

The Don Plant water balance is complex and is a critical factor in the process. As such, process modifications are likely to be necessary to accommodate the relatively low-quality water (primarily due to total dissolved solids) that will be returned from the extraction system. It will not be possible to accommodate the full extraction system flow with a single, simple process modification, but rather a series of individual changes are likely to be necessary, each with an evaluation and testing phase before implementing the next. Therefore, implementation of the extraction is likely to be a phased approach with a process modification made, some extraction wells brought on line (the number being dependant on the flow rate opened up by the process modification), testing of the system and then making adjustments prior to the next process modification. EPA acknowledged the difficulty and the associated implementation approach in the Record of Decision and in the Consent Decree, which allows for a minimum system startup period of one year. The initial design estimates that 18 months will be needed for system startup.

As discussed in Section 3, the remedy includes monitoring of groundwater and water quality at the springs, initially on a quarterly basis, to evaluate the effectiveness and performance of the extraction system. If this monitoring indicates that performance standards (i.e., reducing arsenic to background concentrations at the springs discharging to the Portneuf River) are not being met by the system, additional evaluation will be made and modifications to the extraction may be made. These modifications could include changing extraction flow rates and/or adding wells in some areas.

5.0 REFERENCES

- Bechtel. 1996a. *Remedial Investigation Report for the Eastern Michaud Flats Superfund Site*. Bechtel Environmental, Inc. Prepared for FMC Corporation and the J.R. Simplot Company.
- Bechtel. 1996ba. *Feasibility Study FMC Subarea of the Eastern Michaud Flats Superfund Site*. Bechtel Environmental, Inc. Prepared for FMC Corporation.
- Ecology and Environment Inc., 1996a. *Baseline Human Health Risk Assessment. Eastern Michaud Flats Superfund Site*. Prepared for EPA.
- Ecology and Environment Inc., 1996b. *Baseline Ecological Risk Assessment. Eastern Michaud Flats Superfund Site*. Prepared for EPA.
- MFG. 1996. *Feasibility Study Simplot Subarea of the Eastern Michaud Flats Superfund Site*. Prepared for FMC Corporation.
- USEPA. 1998. *Record of Decision, Declaration Decision Summary and Responsiveness Summary for Eastern Michaud Flats Superfund Site*. Pocatello, Idaho, US EPA Region 10. June 1998.
- USEPA. 2001. *Consent Decree for Remedial Design/Remedial Action for the Simplot Plant Area at the Eastern Michaud Flats Superfund Site*. US EPA Region 10. May 9 2002.

Table 1
Summary of Proposed Extraction Wells and Design Pumping Rates

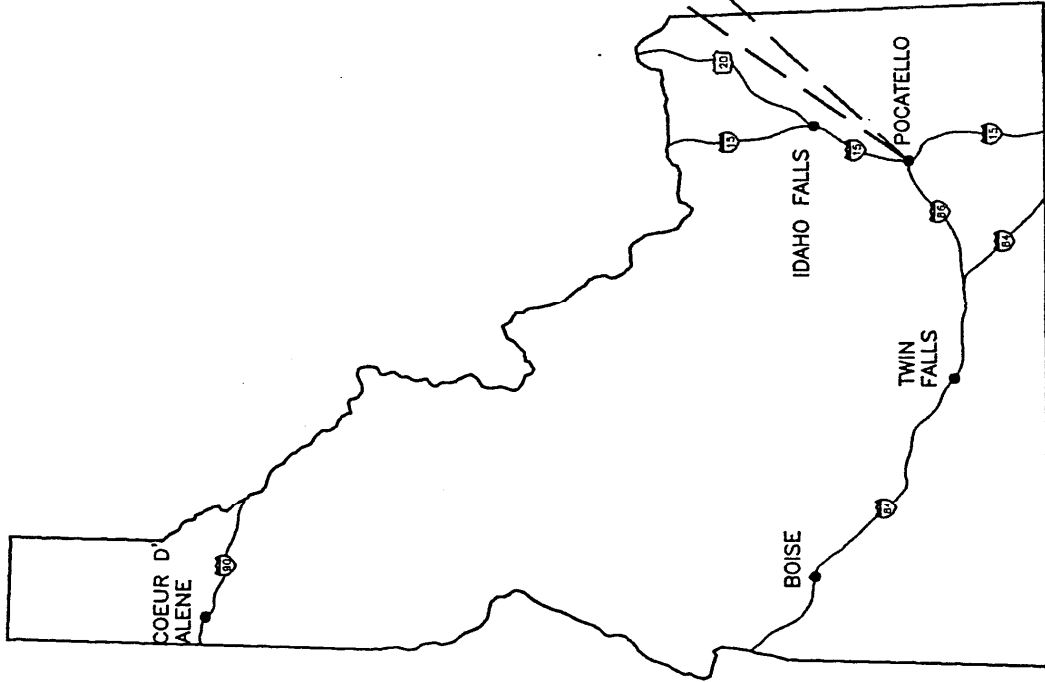
Area	Zone	Well No.	Status	Design Pumping Rate (Annual Avg., gpm)
West Plant Area		401	Existing	63
		402	Existing	72
East Plant Area	Upper	403	New	36
		404	New	36
		405	New	36
		406	New	36
		407	New	36
		408	New	36
		409	New	36
East Plant Area	Lower	410	Existing	180
		411	New	180
				747

Table 2
Estimated Orthophosphate Removal Rate in Extraction Wells

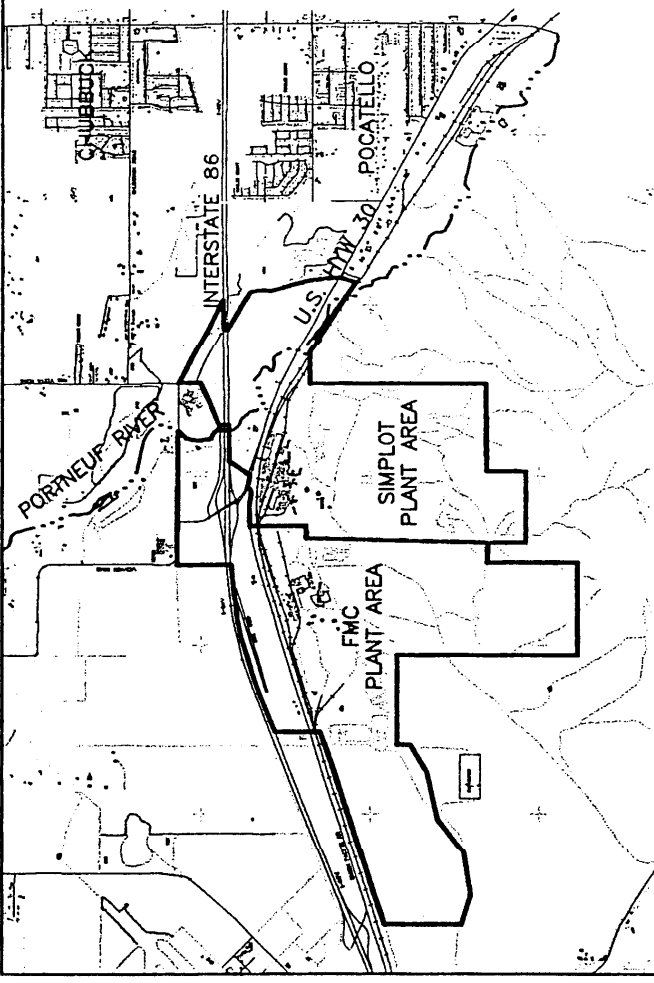
Area	Well No.	Design Pumping Rate (Annual Avg., gpm)	Orthophosphate Concentrations in Groundwater			Estimated Orthophosphate Removal Rate		
			(mg/L)			(lbs/day)		
West Plant Area	401	63	130	-	160	98	-	121
	402	72	130	-	150	112	-	129
East Plant Area	403	36	100	-	120	43	-	52
	404	36	100	-	120	43	-	52
	405	36	190	-	230	82	-	99
	406	36	190	-	230	82	-	99
	407	36	100	-	120	43	-	52
	408	36	100	-	120	43	-	52
	409	36	100	-	120	43	-	52
East Plant Area	410	180	150	-	175	323	-	377
	411	180	150	-	175	323	-	377
TOTAL		747				1,236	-	1,461

Table 3
Anticipated Groundwater Extraction Implementation Schedule

Activity/Deliverable	Date
Draft Groundwater Extraction/Monitoring RDRs to EPA/IDEQ	August 2002
EPA/IDEQ Comments on Draft RDR	September 2002
Prefinal Extraction RDR to EPA/IDEQ	December 2002
EPA/IDEQ Comments on Prefinal RDR	January 2003
Final RDR to EPA/IDEQ	February 2003
EPA Approval of Final RDR	March 2003
Begin Extraction Well Installation/Operation	April 2003
Start-Up Phase	April 2003 to October 2004
System Fully Operational	October 2004



IDAHO



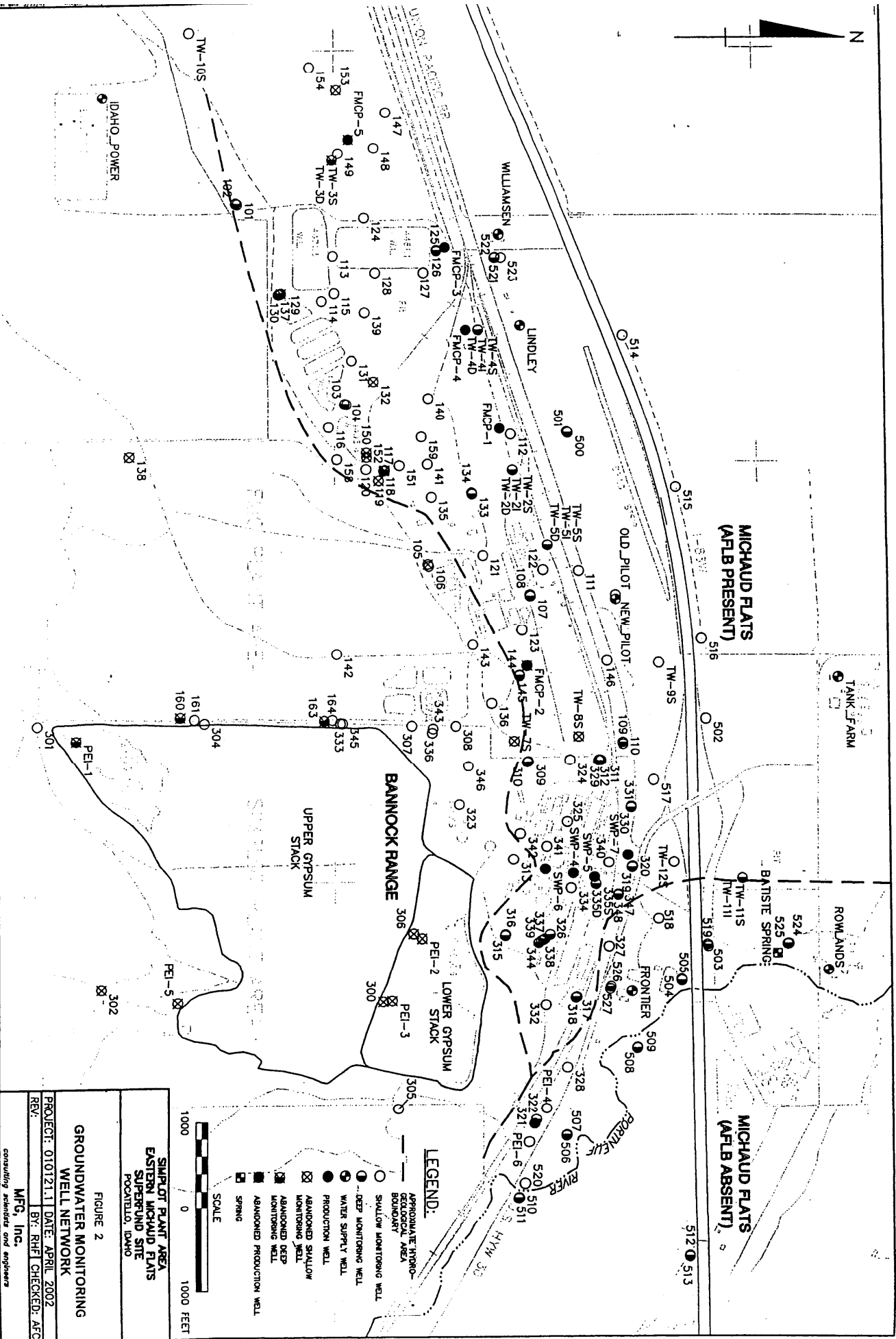
EASTERN MICHAUD FLATS
SUPERFUND SITE VICINITY

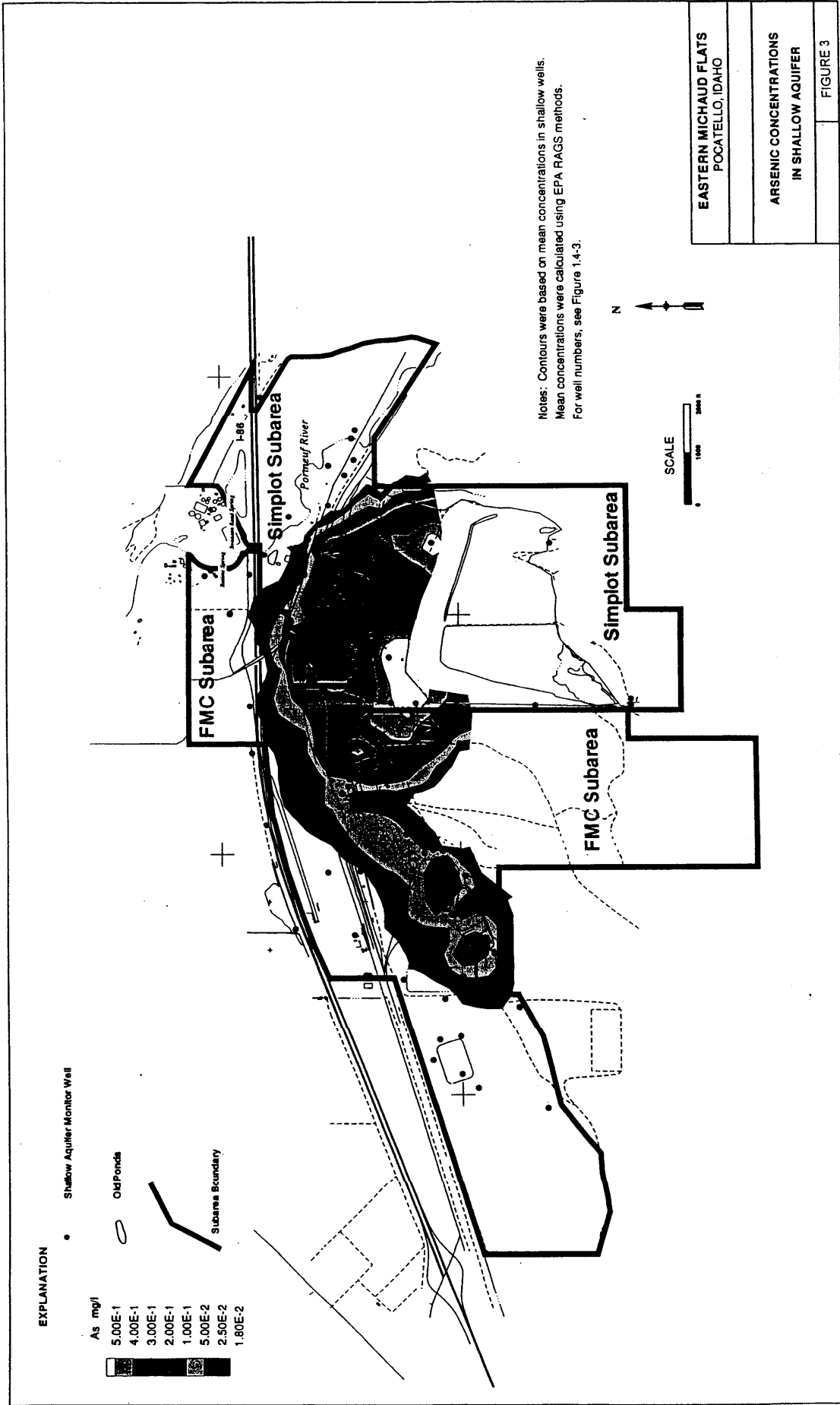
SIMPLLOT PLANT AREA
EASTERN MICHAUD FLATS
SUPERFUND SITE
POCATELLO, IDAHO

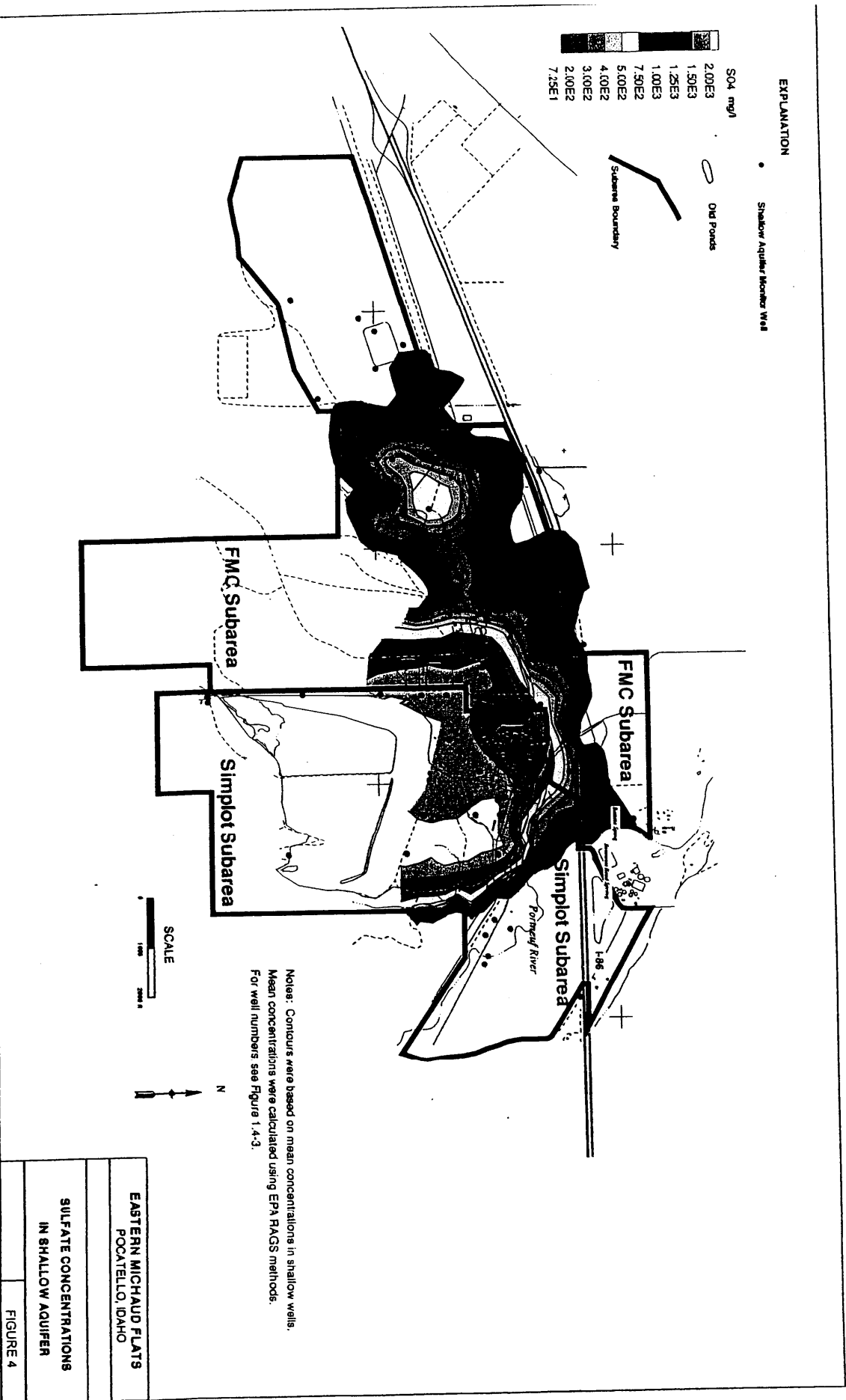
FIGURE 1

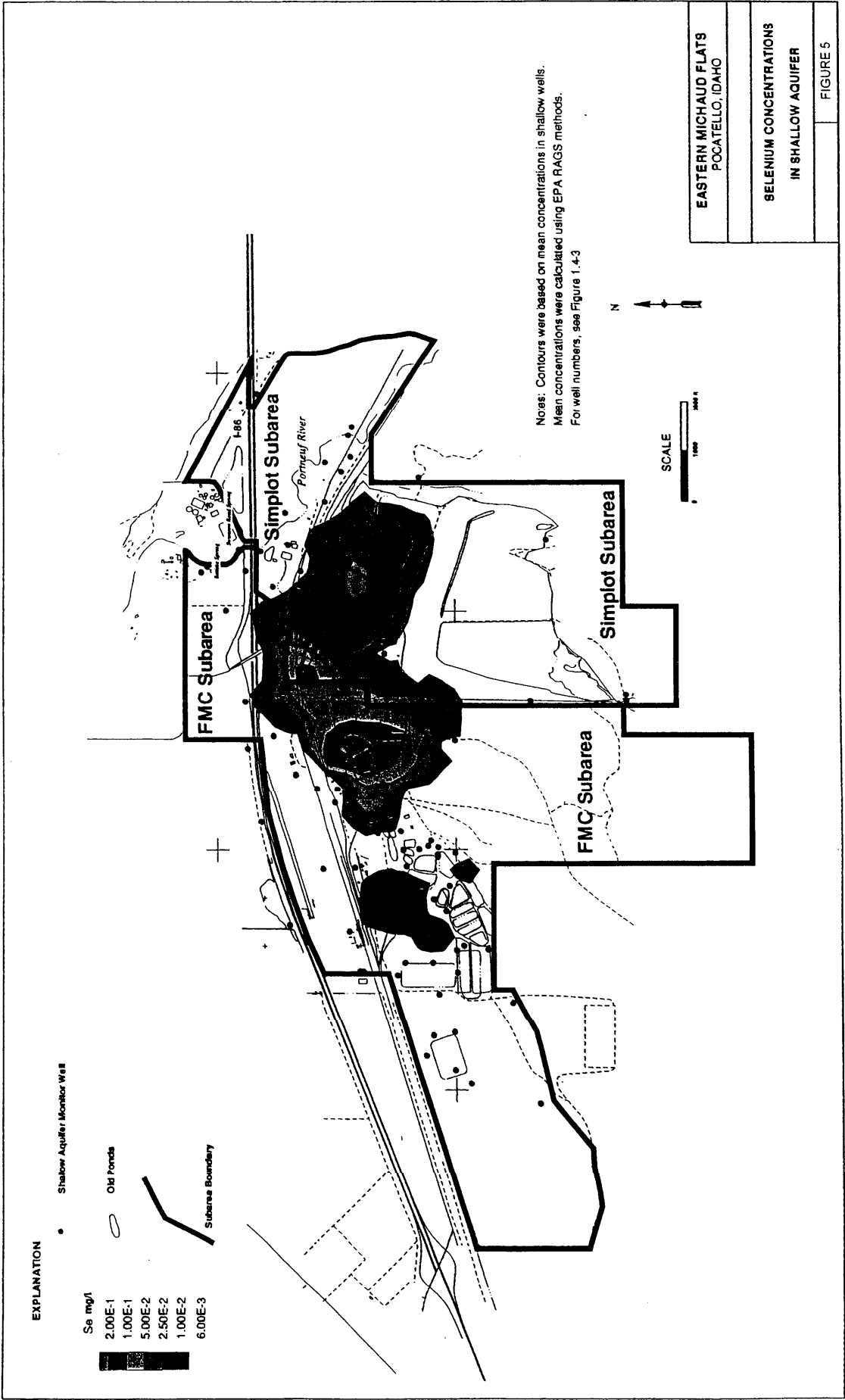
SITE LOCATION MAP

PROJECT: 010121.1	DATE: JULY 2002
REV:	BY: RHF CHECKED: AC
MFG, Inc. consulting scientists and engineers	

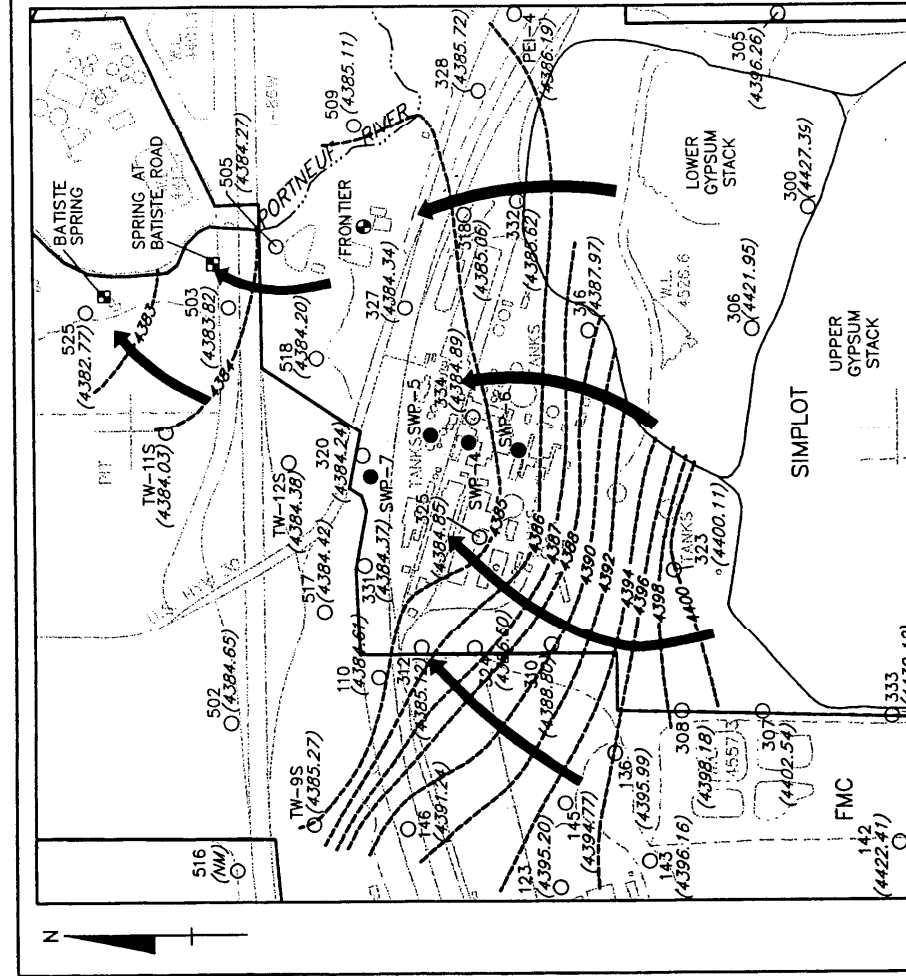








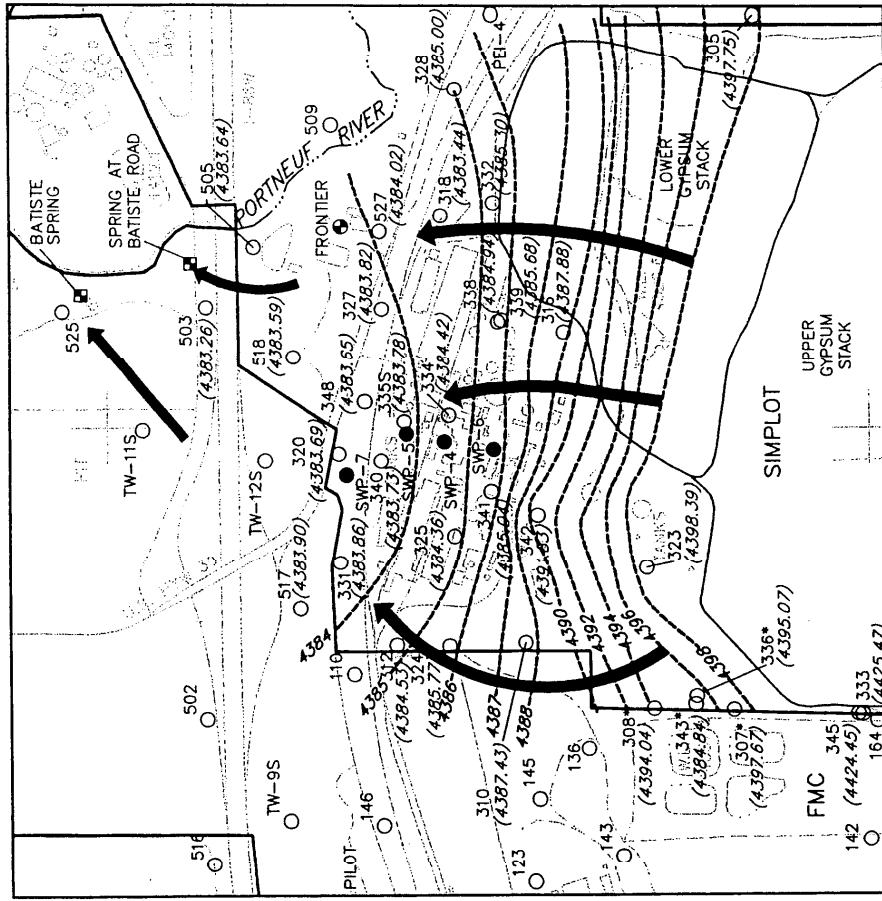
EASTERN MICHAUD FLATS POCATELLO, IDAHO	
SELENIUM CONCENTRATIONS IN SHALLOW AQUIFER	
FIGURE 5	



UPPER ZONE POTENTIOMETRIC SURFACE 1995

LEGEND:

- 346 ○ GROUNDWATER MONITORING WELL LOCATION AND DESIGNATION
- (4397.67) WATER LEVEL ELEVATION MEASURED NOVEMBER 1995 AND AUGUST 2001 (ft MSL)
- ↑ GENERAL DIRECTION OF GROUNDWATER FLOW
- 4388 --- LINE OF EQUAL WATER LEVEL ELEVATION (CONTOUR INTERVAL VARIABLE)
- FRONTIER WATER SUPPLY WELL LOCATION AND DESIGNATION
- SWP-5 PRODUCTION WELL LOCATION AND DESIGNATION
- BATISTE SPRING NATURAL SPRING



UPPER ZONE POTENTIOMETRIC SURFACE 2001

NOTE:

*-WATER LEVEL AFFECTED BY PUMPING AT WELL 343.



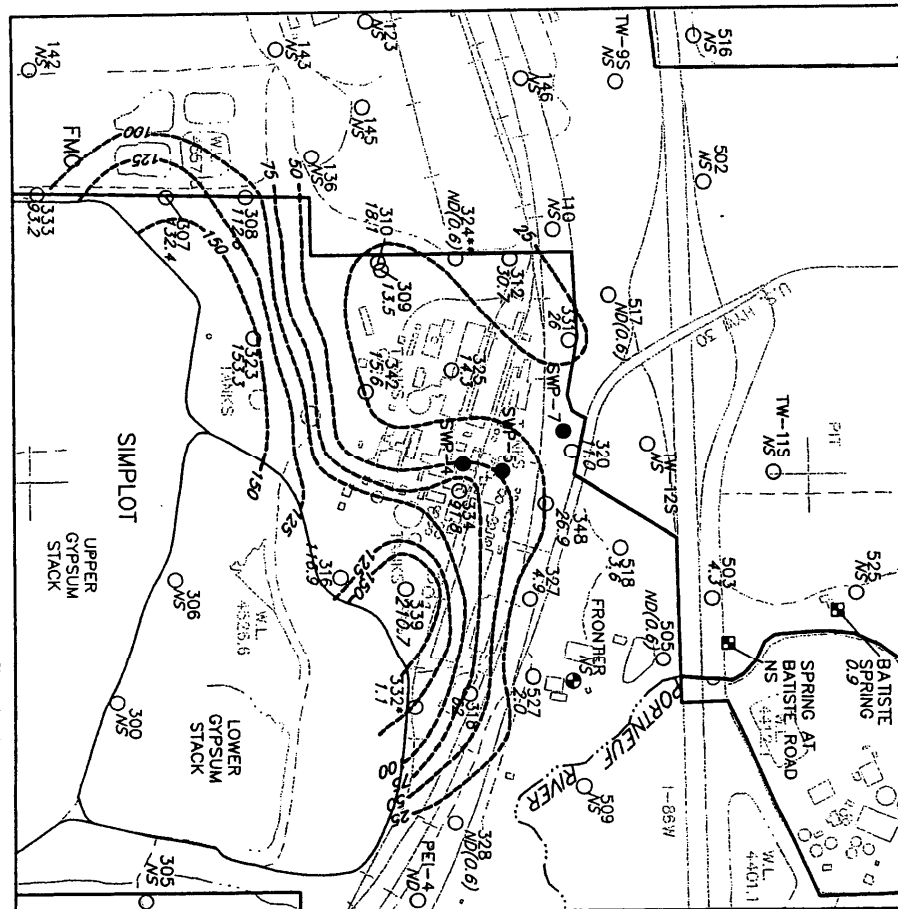
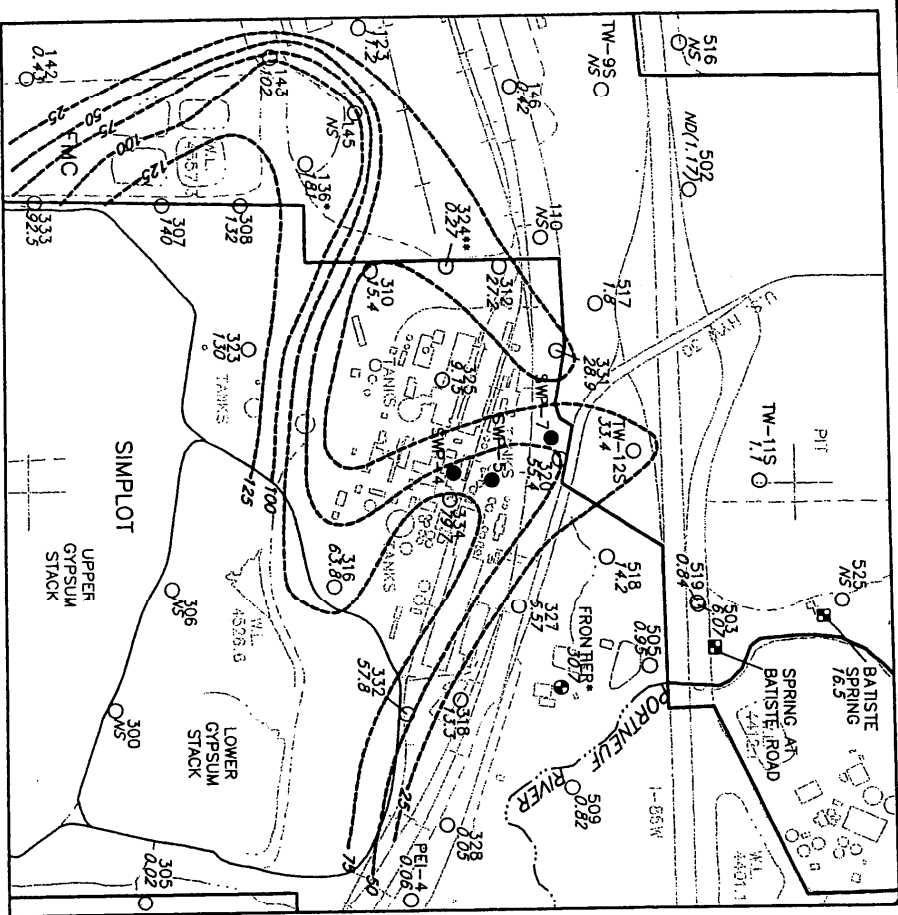
SIMPLLOT PLANT AREA
EASTERN MICHAUD FLATS
SUPERFUND SITE
POCATELLO, IDAHO

FIGURE 7

UPPER ZONE POTENTIOMETRIC SURFACE
AND GROUNDWATER FLOW DIRECTION
MAPS (1995/2001)

PROJECT: 010121.2 DATE: MAY 2002
REV: BY: SCG CHECKED: DEP

MFG, Inc.
consulting scientists and engineers



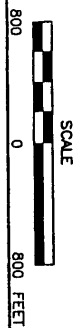
ORTHOPHOSPHATE ISOCONCENTRATION LINES 1995

ORTHOPHOSPHATE ISOCONCENTRATION LINES 2001

LEGEND:
 146 GROUNDWATER MONITORING WELL
 LOCATION AND DESIGNATION
 0.43 CONCENTRATION IN mg/L
 ANALYTE NOT DETECTED AT A
 CONCENTRATION ABOVE THE VALUE
 INDICATED IN THE PARENTHESIS

75 ISOCONCENTRATION LINE
 (CONTOUR INTERVAL VARIABLE)
 FRONTIER WATER SUPPLY WELL LOCATION AND
 DESIGNATION
 SWP-5 PRODUCTION WELL LOCATION AND DESIGNATION
 BATISTE NATURAL SPRING

NOTE:
 *UNUSUALLY HIGH ORTHOPHOSPHATE CONCENTRATIONS
 WERE MEASURED IN WELLS 136 AND FRONTIER IN
 DECEMBER 1995, AND UNUSUALLY LOW
 CONCENTRATIONS WERE MEASURED IN WELL 332 IN
 AUGUST 2001. ISOCONCENTRATION CONTOURS SHOWN
 REFLECT TYPICAL VALUES.
 **WELL 324 NOT CONSIDERED IN DEVELOPING CONTOUR
 AS THIS WELL'S SCREEN EXTENDS INTO LOWER ZONE.



SIMPLOR PLANT AREA EASTERN MICHIGAN SUPERFUND SITE FOUNTAIN, OHIO	
FIGURE 8	
ORTHOPHOSPHATE CONCENTRATIONS IN SIMPLOR PLANT AREA SHALLOW GROUNDWATER 1995 AND 2001	
PROJECT 010121.2	DATE: MAY 2002
REV:	BY: RHF CHECKED: DEP
MFG, Inc.	
consulting scientists and engineers	

Figure 9
Orthophosphate Concentrations in Shallow Groundwater Downgradient of the Western Portion of the Gypsum Stack

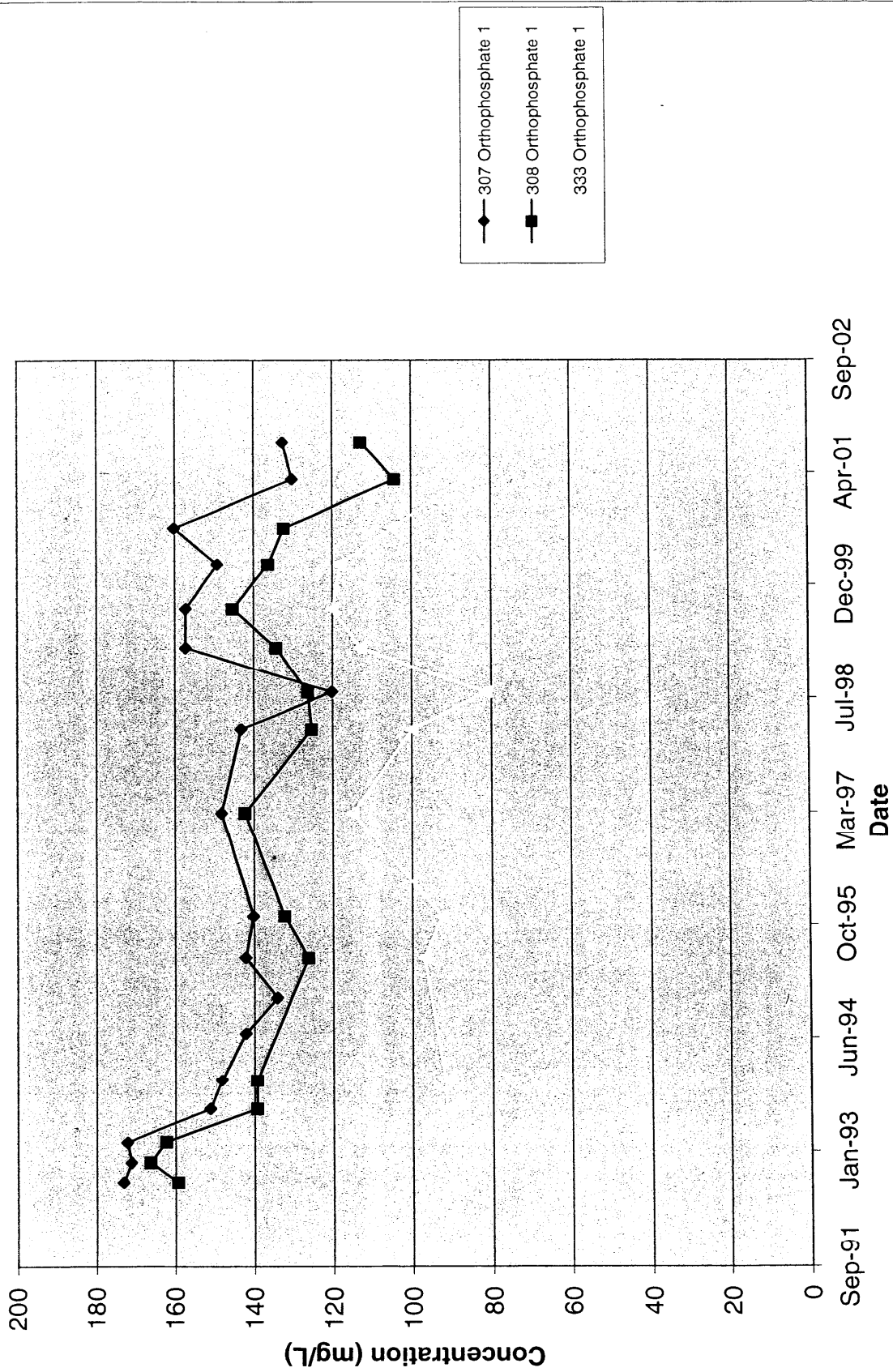


Figure 10
Orthophosphate Concentrations in Shallow Groundwater Downgradient of the Eastern Portion of the Gypsum Stack

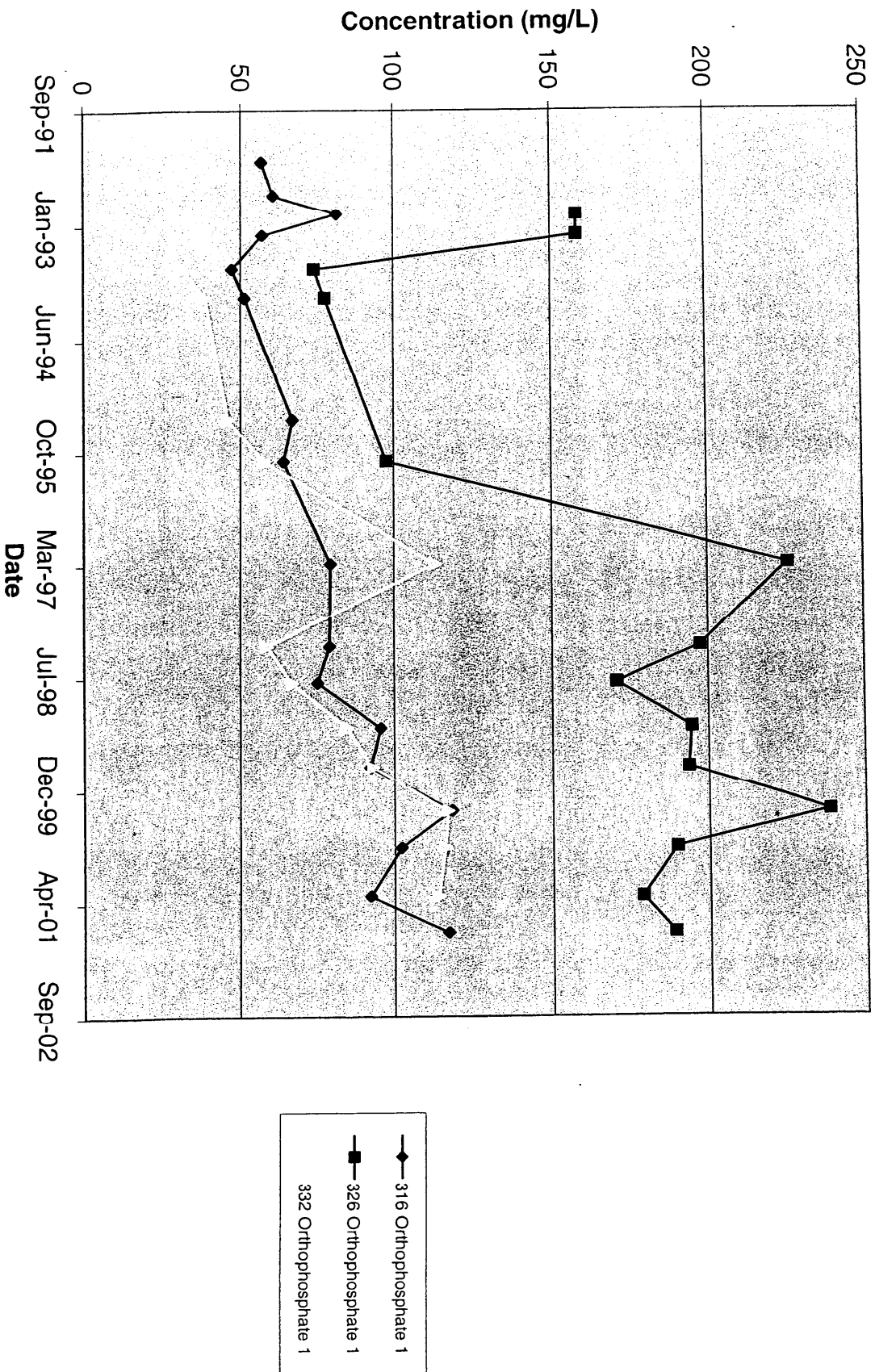
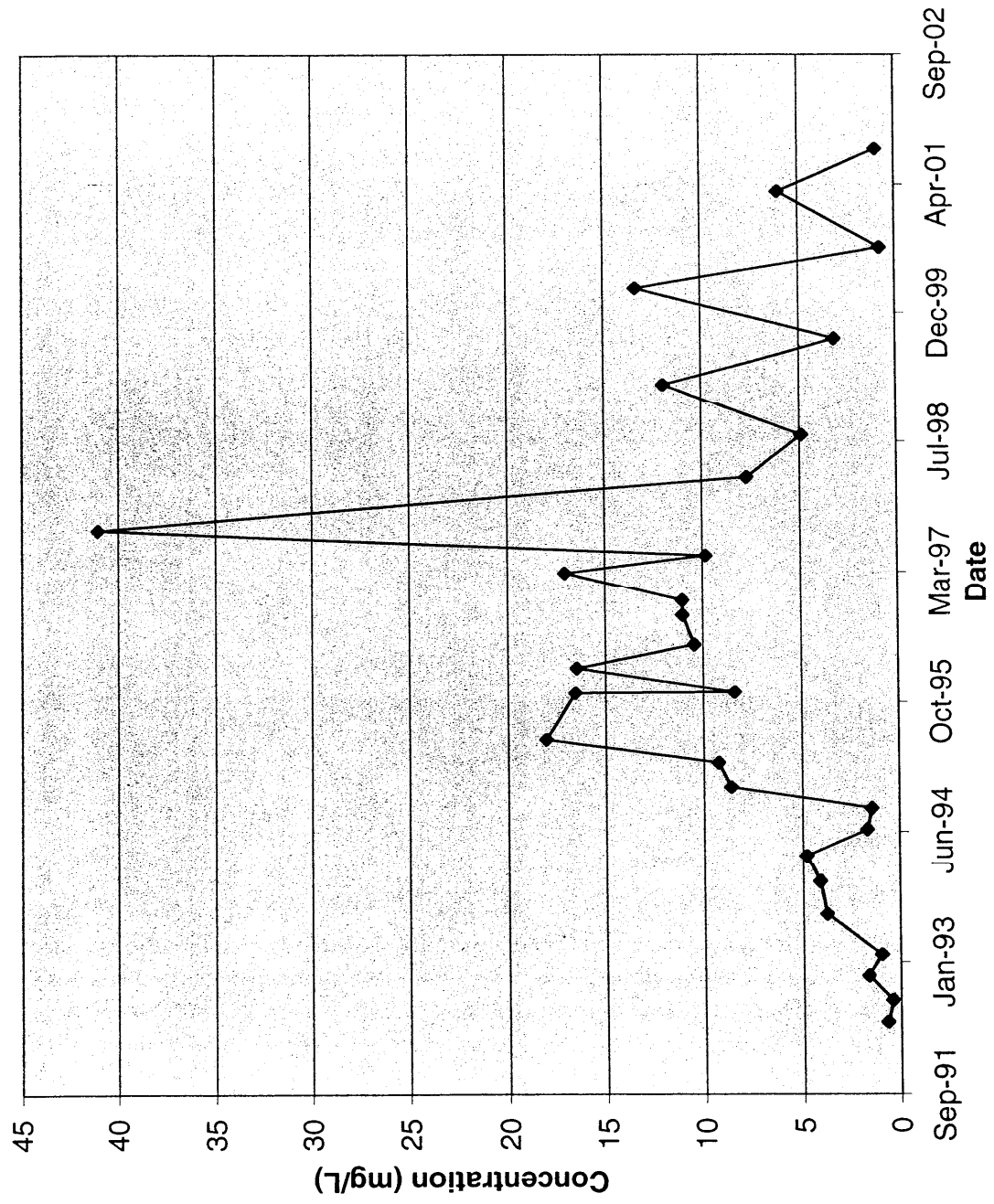
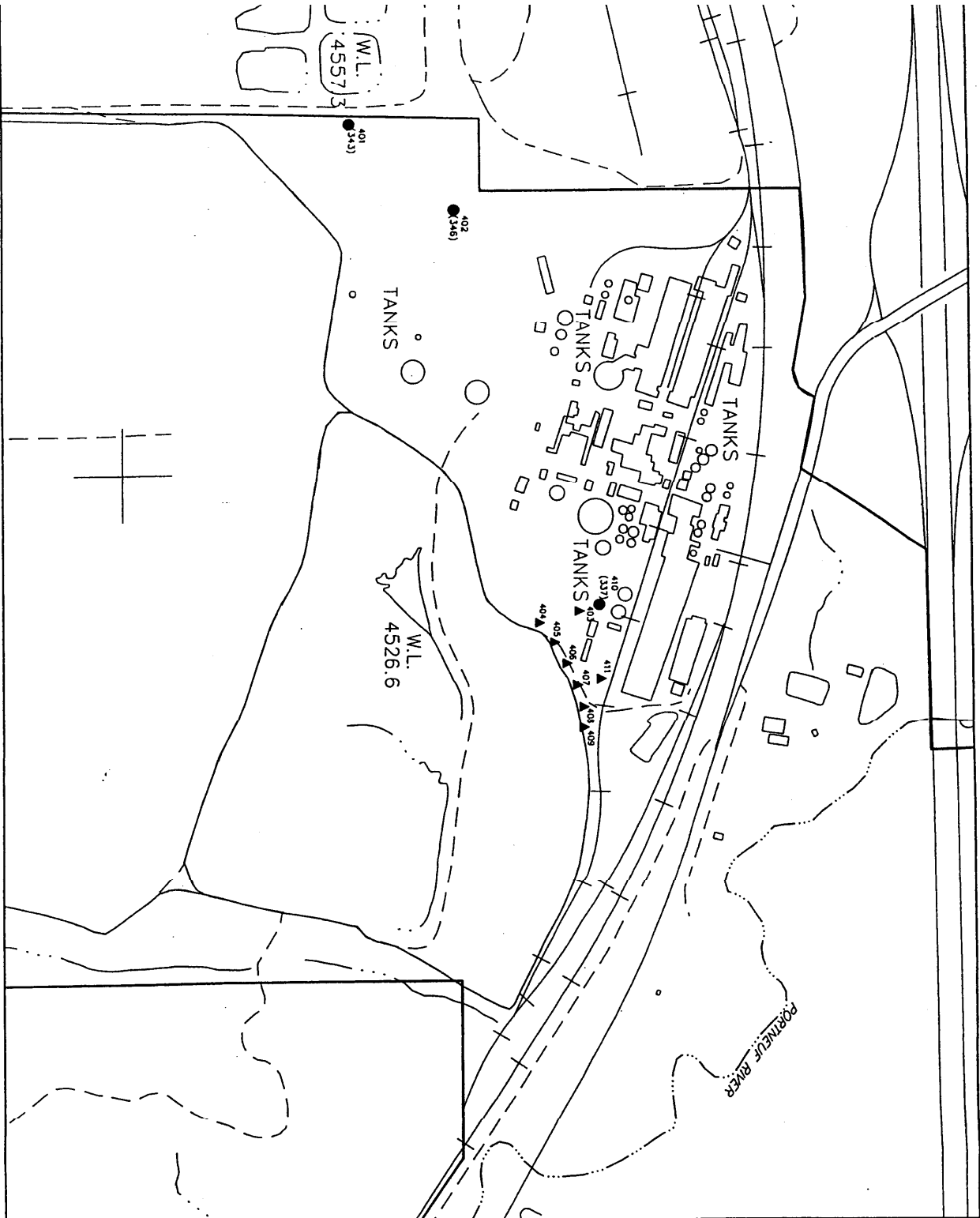


Figure 11
Orthophosphate Concentrations at Batiste Spring





LEGEND:

- ▲ 403 NEW EXTRACTION WELL
- 402 EXISTING EXTRACTION WELL
- ▲ 404 PREVIOUS WELL DESIGNATION NUMBER



**SIMPLIFIED PLANT AREA
EASTERN MICHAUD FLATS
SUPERFUND SITE
POCATELLO, IDAHO**

FIGURE 12

**PROPOSED GROUNDWATER
EXTRACTION WELL LOCATIONS**

PROJECT: 010121.2	DATE: JULY 2002
REV: BY: RHF	CHECKED: AC

MFG, Inc.
consulting scientists and engineers